AMMONIUM FERRIC CITRATE

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

AMMONIUM FERRIC CITRATE

OTHER NAMES

FAC, "ammonium ferric citrate brown powder", "ammonium iron citrate"

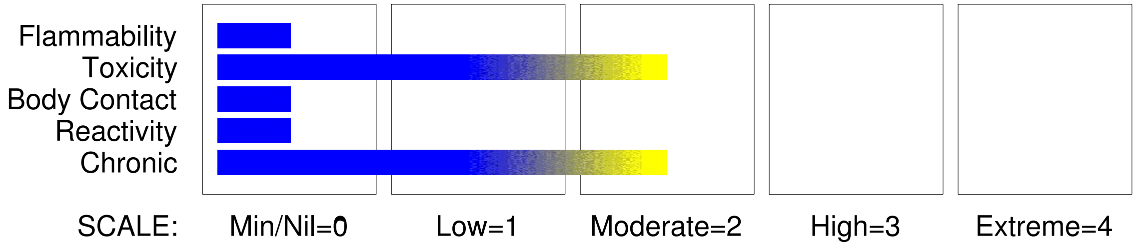
PRODUCT USE

Laboratory reagent, therapeutic source of soluble iron salts.
Food additive 381

SUPPLIER

Company: S D FINE- CHEM LIMITED
Address:
315- 317, T.V. INDUSTRIAL ESTATE,
248, WORLI,
MUMBAI- 400030.INDIA.
technical@sdfine.com
Telephone: 91- 22- 24959898
Telephone: 91- 22- 24959899
Fax: 91- 22- 24937232

HAZARD RATINGS



Section 2 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

HAZARD

Not hazardous
No hazards determined by using GHS criteria

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PRECAUTIONARY STATEMENTS

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
ammonium ferric citrate	1185-57-5	100

Section 4 - FIRST AID MEASURES

SWALLOWED

Overexposure is unlikely in this form and quantity.
Rinse mouth out with plenty of water.
For advice, contact a Poisons Information Centre or a doctor.

EYE

If this product comes in contact with the eyes:
- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If skin or hair contact occurs:
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If dust is inhaled, remove from contaminated area.
- Encourage patient to blow nose to ensure clear passage of breathing.
- If irritation or discomfort persists seek medical attention.
- If fumes or combustion products are inhaled remove from contaminated area.
- Other measures are usually unnecessary.

NOTES TO PHYSICIAN

Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.

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- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

FIRE/EXPLOSION HAZARD

- Non combustible.
- Not considered a significant fire risk
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- Decomposes on heating and produces toxic fumes of carbon monoxide (CO).
- May emit acrid smoke and poisonous, corrosive fumes.

Other combustion products include: carbon dioxide (CO_2) and ammonia.

FIRE INCOMPATIBILITY

Avoid contact with strong acids and alkalies.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

Clean up all spills immediately.
Avoid contact with skin and eyes.
Wear impervious gloves and safety glasses.
Use dry clean up procedures and avoid generating dust.
Place spilled material in clean, dry, sealable, labelled container.

MAJOR SPILLS

- Clear area of personnel and move upwind.
- If inhalation risk of exposure exists, wear SAA approved dust respirator.
- Collect recoverable product into labelled containers for recycling.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:

ammonium ferric citrate	500 mg/m³

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

ammonium ferric citrate	500 mg/m³

other than mild, transient adverse effects without perceiving a clearly defined odour is:

ammonium ferric citrate	3 mg/m³

The threshold concentration below which most people will experience no appreciable risk of health effects:

ammonium ferric citrate	1 mg/m³

continued...

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	>= 0.1%	Toxic (T)	>= 3.0%
R50	>= 0.25%	Corrosive (C)	>= 5.0%
R51	>= 2.5%		
else	>= 10%		

where percentage is percentage of ingredient found in the mixture

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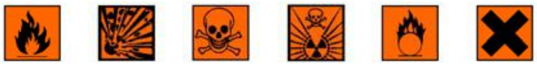
SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



\+ + + + + +

+: May be stored together
O: May be stored together with specific preventions
X: Must not be stored together

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Limit all unnecessary personal contact.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- When handling DO NOT eat, drink or smoke.
- Always wash hands with soap and water after handling.
- Avoid physical damage to containers.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.

SUITABLE CONTAINER

Packaging as recommended by manufacturer.
- Check that containers are clearly labelled.

Store in a dark glass or other suitable light resistant container.
Container must be air-tight.

STORAGE INCOMPATIBILITY

Keep dry.
Store in a cool area and away from sunlight.
Keep containers securely sealed.
Segregate from strong acids and alkalies.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- No smoking, naked lights or ignition sources.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.

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- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

Aqueous solutions can grow moulds.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

• ammonium ferric citrate:	CAS:1185- 57- 5 CAS:52336- 55- 7 CAS:1333- 00- 2 CAS:15226- 45- 6

MATERIAL DATA

The recommended TLV is thought to reduce the likelihood of respiratory irritation and skin irritation from exposure to aerosols and mists of soluble iron salts.

PERSONAL PROTECTION

EYE

- Safety glasses.

HANDS/FEET

No special equipment needed when handling small quantities.
OTHERWISE: Wear general protective gloves, eg. light weight rubber gloves.

OTHER

No special equipment needed when handling small quantities
OTHERWISE:

- Overalls
- Eyewash unit.

RESPIRATOR

Protection Factor	Half- Face Respirator	Full- Face Respirator	Powered Air Respirator
10 x ES	P1 Air- line*	- -	PAPR- P1 -
50 x ES	Air- line**	P2	PAPR- P2
100 x ES	-	P3 Air- line*	- -
100+ x ES	-	Air- line**	PAPR- P3

* - Negative pressure demand ** - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.
For further information consult

continued...

your
Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

None required when handling small quantities.
OTHERWISE: Use in a well-ventilated area.

- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:
(a): particle dust respirators, if necessary, combined with an absorption cartridge;
(b): filter respirators with absorption cartridge or canister of the right type;
(c): fresh-air hoods or masks
- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:	Air Speed:
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1- 2.5 m/s (200- 500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5- 10 m/s (500- 2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood- local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 metres distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

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Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Yellow-brown (17%Fe) to brown (28%Fe) powder. No odour. Soluble in water. Therapeutic grades (BP) are thin, deliquescent, dark red, transparent scales and have 21% Fe. Soluble in water, insoluble in alcohol and ether. Ammonium ferric citrate, green contains 14.5-16% Fe, 7.5% NH3, and 75% hydrated citric acid, Occurs as green, transparent, deliquescent scales, pearls, granules or powder with mild ferruginous taste. More readily reduced to the ferrous salt by light than the brown form; mixes with water.

PHYSICAL PROPERTIES

Solid.
Mixes with water.

Molecular Weight: Not available
Melting Range (℃): Not available
Solubility in water (g/L): Miscible
pH (1% solution): Not available
Volatile Component (%vol): Negligible
Relative Vapour Density (air=1): Not applicable
Lower Explosive Limit (%): Not applicable
Autoignition Temp (℃): Not available
State: Divided solid
Boiling Range (℃): Not available
Specific Gravity (water=1): Not available
pH (as supplied): Not available
Vapour Pressure (kPa): Negligible
Evaporation Rate: Not available
Flash Point (℃): Not applicable
Upper Explosive Limit (%): Not applicable
Decomposition Temp (℃): Not available

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

Product is considered stable and hazardous polymerisation will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

Accidental ingestion of the material may be damaging to the health of the individual.
Considered to be non toxic.
Use in food and as food additive, indicates high degree of tolerance.
Iron poisoning, although rare, may result in epigastric pain and vomiting followed over 6 -8 hours by shock, and in severe case coma and death. The toxicity of iron compounds increases in proportion to their solubility in the gastrointestinal tract. Vomitus frequently contains blood, due in part to capillary dilation and blood loss through gastrointestinal walls (diapedesis). Watery diarrhoea with ribbons of bowel mucosa contribute to cardiovascular collapse from fluid and electrolyte loss. Although a

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quiescent period may follow some victims relapse within 12 hours into lethal secondary shock. During relapse a profound metabolic acidosis is encountered. This has been attributed to hydrolysis of ferric ions in blood as well as increases in the level of lactic and citric acids. Respiratory changes resulting from acidosis are often evident. Postmortem examination often reveals liver damage consisting of periportal haemorrhagic necrosis. Poisoning may also produce a metallic taste, restlessness, lethargy, hypotonia, coma, pallor or cyanosis, fast, weak pulse, hypotension, hyperventilation (due to acidosis), shock, vasomotor instability and cardiovascular collapse. Pneumonitis, pulmonary oedema and haemorrhage, convulsions, liver impairment with jaundice, hypoglycaemia, multiple coagulation defects, kidney damage with anuria, pancreatic damage , vascular damage, hypovolaemia, haemoconcentration, profound shock and vascular collapse have been reported. Survivors may display gastric scarring or obstruction, pyloric obstruction or stenosis, mild hepatic scirrhosis or neuralgic sequelae.
Human metabolism allows detoxification of ammonia, however toxic effects appear if this mechanism is overwhelmed by other than small doses. Large doses of ammonium salts may produce diarrhoea and may be sufficiently absorbed to produce diuresis and systemic ammonia poisoning. Such poisonings have been described after parenteral administration of the salts and produce flaccidity of facial muscles, tremor, generalised discomfort, anxiety and impairment of motor performance, recognition and of critical flicker fusion. Such a clinical picture resembles that found in terminal liver failure - elevated levels of ammonia are found regularly in advanced liver disease.

EYE

Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).

SKIN

The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.
Solution of material in moisture on the skin, or perspiration, may increase irritant effects.

INHALED

The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.
Not normally a hazard due to non-volatile nature of product.

CHRONIC HEALTH EFFECTS

Principal routes of exposure are by accidental skin and eye contact and inhalation of generated dusts.
Chronic excessive iron intakes have been associated with haemosiderosis and consequent possible damage to the liver and pancreas.

High levels of iron may raise the risk of cancer. This concern stems from the theory that iron causes oxidative damage to tissues and organs by generating highly reactive chemicals, called free radicals, which subsequently react with DNA. Cells may be disrupted and may be become cancerous. People whose genetic disposition prevents them from keeping tight control over iron (e.g. those with the inherited disorder, haemochromatosis) may be at increased risk.

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Iron overload in men may lead to diabetes, arthritis, liver cancer, heart irregularities and problems with other organs as iron builds up.

[K. Schmidt, New Scientist, No. 1919 pp.11-12, 2nd April, 1994].

TOXICITY AND IRRITATION

No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

No data for ammonium ferric citrate.

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Bury residue in an authorised landfill.
- Recycle containers if possible, or dispose of in an authorised landfill.

For small quantities:

- Dissolve the material (in water or acid solution as appropriate) or convert it to a water soluble state with appropriate oxidising agent.
- Precipitate as the sulfide, adjusting the pH to neutral to complete the precipitation.
- Filter off sulfide solids for recovery or disposal to approved land-fill.
- Destroy excess sulfide in solution with, for example, sodium hypochlorite, neutralise, and flush to sewer (subject to local regulation).

Section 14 - TRANSPORTATION INFORMATION

HAZCHEM: None

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS:UN, IATA, IMDG

Section 15 - REGULATORY INFORMATION

REGULATIONS

No regulations applicable
No data available for ammonium ferric citrate as CAS: 1185-57-5, CAS: 52336-55-7, CAS: 1333-00-2, CAS: 15226-45-6.

Section 16 - OTHER INFORMATION

continued...

INGREDIENTS WITH MULTIPLE CAS NUMBERS

Ingredient Name	CAS
ammonium ferric citrate	1185- 57- 5, 52336- 55 - 7, 1333- 00- 2, 15226- 45- 6

The above information is believed to be accurate and represent the best information currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation to determine the suitability of the information for their particular purpose.

Issue Date: 5-Apr-2018